Tanta University	**3rd year, Computers & Control Dept.**
Faculty of Engineering	**Digital Control**

Sheet 1

1. Find $e(0)$ and $e(10)$ for:

$$E(z) = \frac{1}{(z-1)(z-0.3)}$$

Using the partial fraction technique. Then check the value of $e(0)$ using the initial value theorem.

2. A function $e(t) = A\,cos(wt)$ is sampled every $T = 0.2\,sec$. If the z-transform of the resultant number sequence

$$E(z) = \frac{3z(z-0.6967)}{z^2 - 1.3934z + 1}$$

Find A and w.

3. Solve the given difference equation for $y(k)$ using :
   a. The sequential technique.
   b. The z-transform

$$y(k+2) - \frac{3}{4}y(k+1) + \frac{1}{8}y(k) = e(k)$$

Will the final value thermo give the correct value of $y(k)$ as $\rightarrow \infty$? where $e(k) = 1,\, k = 0,1,2,3, \dots \dots\ y(0) = y(1) = 0$

4. A function $e(t)$ sampled, and the resultant output sequence has the following z-transform

$$E(z) = \frac{z^3}{z^3 + 3z^2 + 5z - 9}$$

   a. Find the z-transform of $e(t - 3T)u(t - 3T)$
   b. Find the z-transform of $e(t + T)u(t + T)$

5. Given a discrete-time dynamic system represented by the difference equation:

$$x(k+2) + 3x(k+1) + 2x(k) = e(k)$$

Where

$$e(k) = \begin{cases} 1 & , k = 0 \\ 0 & , otherwise \end{cases}$$

with the initial conditions $x(0) = 0$, $x(1) = -1$ solve for $x(k)$ as function of time k.